REMARKS

Claims 1, 4-6 and 9-11 are pending in this application. By this Amendment, claim 1 is amended to distinguish the claimed invention from the cited Sulzbach reference. Claim 5 is amended to overcome the rejection under 35 U.S.C. §112, second paragraph. Claims 2, 3, 7 and 8 have been canceled. New claim 11 has been added.

No new matter is added by this Amendment. Support for the language added to claim 1 can be found in paragraph 35 and 36 of the specification and original claims 2 and 3. Support for the language added to claim 5 can be found in paragraph 26 of the specification. Support for claim 11 can be found in paragraph 15 of the specification.

I. Rejection Under 35 U.S.C. §112, second paragraph

Claims 5 and 10 were rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite. In particular, the Patent Office alleges that "the flame retardant" recited in claim 5 lacks antecedence. This rejection is respectfully traversed.

Applicants have amended claim 5 to provide antecedence for "the flame retardant" recited in claim 5. Accordingly, Applicants submit that this rejection is now moot. Reconsideration and withdrawal of the rejection are thus respectfully requested.

II. Rejection Under 35 U.S.C. §102(b)

Claims 1-3 and 6-8 were rejected under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Patent No. 5,834,527 ("Sulzbach"). This rejection is respectfully traversed.

According to the Patent Office, Sulzbach teaches preparation of rigid polyurethane foam wherein carbon dioxide is dissolved in the polyol component under pressure prior to combination with the isocyanate, and work-up with water is also included in the reactive material to achieve foams having similar densities.

Claim 1 recites a preparation method for low-density rigid polyurethane foam excelling in dimensional stability, wherein rigid polyurethane foam having an average value for a ratio of lengthwise direction diameter/cross direction diameter of cells of 1.0 to 1.4 and a density of 20 to 40 kg/m^3. This rigid polyurethane foam is prepared by combining, as blowing agent, carbon dioxide generated in the reaction between water and polyisocyanate and carbon dioxide under supercritical state, subcritical state or liquid state, and by adding said water and said carbon dioxide under liquid state into said polyol component, which polyol component is being transferred in a flow path to a mixing head and the addition occurs prior to mixing the polyisocyanate component and the polyol component in the mixing head. The polyol component prepared by combining the water and the carbon dioxide under liquid state is kept under a state corresponding to supercritical state of carbon dioxide or subcritical state of carbon dioxide in the flow path to the mixing head. The prepared foam has a closed-cell content from 70 to 85% and a water vapor permeance of less than 420 ng/(m^2·S·Pa) at a thickness of 25 mm. The water is mixed in an amount of 5 to 8 parts by weight to 100 parts by weight of polyol in said polyol component, and said carbon dioxide under liquid state is mixed in an amount of 0.5 to 3 % by weight to a sum of said polyisocyanate component and said polyol component.

Sulzbach does not teach or suggest that the water is mixed in an amount of 5 to 8 parts by weight to 100 parts by weight of polyol in said polyol component as recited in claim 1. Sulzbach mentions water at only one location, teaching that a polyol component may be used that contains 3.5 wt.% CO_2 and 2 wt.% H_2O. See column 3, line 62 of Sulzbach. Thus, Sulzbach at best teaches only 2 wt.% water. This is very different than the range recited in claim 1.

That Sulzbach's teaching of using 2 wt.% water on the basis of the polyol component does not teach or suggest the claim 1 method is demonstrated in Comparative Example 2 of

the present specification. Comparative Example 2 discloses that water is mixed in the amount of 3 parts by weight to 100 parts by weight of polyol in the polyol component, the polyol component totaling 144 parts by weight. This amount of water corresponds to 2.1 wt.% of the polyol component (i.e., 3 parts water to 144 parts of the entire polyol component equals 2.1 wt.% water). See Table 1. Sulzbach, at 2 wt.% water of the polyol component, is even further away from claim 1 than the amount of water used in this comparative example.

Comparative Example 2 resulted in a foam with too great a density and poor incombustibility. See Table 2. This comparative example thus evidences that Sulzbach's process would not produce a foam having the same properties recited in claim 1. Further, as Sulzbach describes none of the advantages of using additional amounts of water, Sulzbach would not have suggested claim 1 to one of ordinary skill in the art.

As described in the specification, the amount of water in the present method contributes to the desirable properties of the rigid polyurethane foam derived from the method. For example, fine foams with homogenous cell size are formed after the reaction. See paragraph 16 of the present specification. Thus, the resulting rigid polyurethane foam shows an isotropy with a ratio of lengthwise direction/cross direction diameter of cells within the range of 1.0 to 1.4. See paragraph 29 of the present specification.

As a result, there is less risk of shrinkage than rigid polyurethane foam obtained by the conventional preparation method. This causes a high dimensional stability. See paragraph 29 of the present specification. As the foam density is 20 to 40 kg/m^3, the rigid polyurethane foam is as economical as the product. See paragraph 29 of the present specification.

Furthermore, as the closed cell content is 70 to 80%, the water vapor permeance is less than 420 $ng/(m^2 \cdot S \cdot Pa)$ at a thickness of 25 mm. See paragraph 29 of the present specification. In other words, if the closed cell content becomes less than 70%, the water

vapor permeance increases, but if the closed cell content exceed 85 %, the dimensional stability decreases.

In contrast, Sulzbach does not teach or suggest that the water and carbon dioxide under a liquid state are added to the polyol component which is being transferred in the path of flow reaching to a mixing head prior to mixing the polyisocyanate component and the polyol component in the mixing head, and the polyol component prepared by combining the water and the carbon dioxide under liquid state is kept under supercritical state or subcritical state in the flow path to the mixing head and said water is mixed in an amount of 5 to 8 parts by weight to 100 parts by weight of polyol in the polyol component and said carbon dioxide under liquid state is mixed in an amount of 0.5 to 3 % by weight to a sum of the polyisocyanate component and the polyol component as recited in claim 1.

Thus, the method taught by Sulzbach differs significantly from the claimed method, does not achieve a rigid polyurethane foam having the recited properties, and does not teach or suggest any of the above-mentioned advantages. As such, Sulzbach fails to teach or suggest the claimed method.

Accordingly, Applicants submit that the present claims are allowable over Sulzbach. Reconsideration and withdrawal of the rejection are thus respectfully requested.

III. Rejection Under 35 U.S.C. §103(a)

Claims 4, 5, 9 and 10 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Sulzbach in view of U.S. Patent No. 5,798,533 ("Fishback"). This rejection is respectfully traversed.

Fishback does not remedy the deficiencies Sulzbach. In particular, Fishback does not teach or suggest that the water and carbon dioxide under a liquid state are added to the polyol component which is being transferred in the path of flow reaching to a mixing head prior to mixing the polyisocyanate component and the polyol component in the mixing head, and the

polyol component prepared by combining the water and the carbon dioxide under liquid state is kept under supercritical state or subcritical state in the flow path to the mixing head and said water is mixed in an amount of 5 to 8 parts by weight to 100 parts by weight of polyol in the polyol component and said carbon dioxide under liquid state is mixed in an amount of 0.5 to 3 % by weight to a sum of the polyisocyanate component and the polyol component as recited in claim 1.

Applicants submit that neither Sulzbach nor Fishback, in combination or alone, teach or suggest the present claims. Reconsideration and withdrawal of the rejection are thus respectfully requested.

IV. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1, 4-6 and 9-11 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

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